DIVISION OF FORESTRY AND WILDLIFE

FY 1999, 2000, 2001

Michael Buck, Administrator

Hawai`i's beautiful watershed. This photo is taken at Hanawī, Maui. Photo Credit: the DOFAW.

ROLE AND ORGANIZATION

The Division of Forestry and Wildlife (DOFAW) is the largest land management entity in the State of Hawai`i. The DOFAW's lands are managed through an integrated system of forest and natural area reserves, plant and wildlife sanctuaries, and wilderness and game management areas.

Prior to statehood, in 1959, responsibility for these tasks was administered by the Hawai'i Territorial Board of Forestry and Agriculture. In 1903, out of concern for the deteriorating water supply for Oahu's growing urban population and Hawaii's sugar industry, the Board created the forest reserve system to reforest the land and ensure a consistent supply of water. As a result, the Territory and private landowners partnered to remove thousands of wild cattle and other animals, fencing, and reforestation of millions of tress.

2003 will mark the centennial of Hawai`i's forest reserve system, one of the old-

- The DOFAW manages the 11th largest forest in the United States.
- 2003 will mark the centennial of Hawaii's forest reserve system, one of the oldest in the nation.
- The large number of introduced species in Hawai`i poses a serious threat to native forests, wildlife, and water sources.
- State resource allocation per acre is insufficient to cover costs.

est in the nation. Today, the DOFAW has seven program areas: watershed protection and management; native ecosystem protection and management; forest resources management; wildlife resources management; outdoor recreation; planning and information services; and administrative management.

The DOFAW is one of the few forest management agencies in the United States, which also manages wildlife. In addition to protecting pristine forest ecosystems through the Natural Area Reserves System, (NARS) the DOFAW also manages forests for commercial harvest, a statewide trail and access system (Nā Ala Hele) as well as hunting programs for game birds and mammals. Each of these management responsibilities represents the interests of a particular public constituency. The Division's task is to balance these user groups, which at times are competing, while sustaining Hawai`i's forest resources. Despite this broad mandate, the Division's fiscal and human resources are among the lowest in the nation.

The DOFAW's physical infrastructure includes an administrative office in Honolulu, four branch management offices covering six islands, a central tree nursery and numerous field management structures. Current staffing levels are 154 full time positions, representing a wide diversity of professional, technical, and blue-collar workers. Current annual budget is $12 million with a wide range of federal and state funding sources.

Hahai no ka ua i ka ulu lā'au
Rain always follows the forest
Hawaiian proverb

"In Hawai'i the most valuable product of the forest is water rather than wood. It follows that conservation of its watersheds by keeping them permanently clothed in protecting forests, is the chief duty of the forester."
Ralph S. Hosmer
First Territorial Forester

SURVEY OF FOREST AND WILDLIFE RESOURCES, 1998-2002

Forests

Hawai`i has the 11th largest state-owned forest and natural area reserve system in the United States with direct responsibility for approximately 944,207* acres of state trust lands. A similar acreage of forest land in private ownership, and an additional 150,000 acres within federal jurisdiction (national parks, national wildlife refuges, military training areas), augments this. The forest reserves and much of the watershed within the conservation districts are in good hydrologic condition. Hawai`i's long-standing policy of watershed protection has resulted in dramatic improvements from the degraded conditions that prevailed at the turn of the century. Management activities, such as protective zoning, fencing, removal or control of feral animals, reforestation, and fire protection have reduced excessive erosion and loss of vegetative cover.

In spite of these achievements, much work is still needed. The increased demand for forest recreation and conflict between user groups have resulted in emotional, and at times divisive, debates over forest land use practices. Population growth resulting in increased residential developments, and improved access to wildlands has increased the potential for wildfire, placing public safety and resources at risk. In some mountain areas, watersheds are deteriorating as forest cover is being removed from the combined impacts of fire, feral grazing animals, and land development. Native ecosystems are being degraded by invasive noxious weeds and feral animals. State foresters estimate that only 50% of the public forests can now be classified as intact native forests (e.g. composed of pre-

*These acres are calcuated from data contained in the State of Hawai`i Geographical Information System (a computer-based mapping system), and may vary slightly from the acreage annotated in other sources.

dominately native species).

State forest reserve lands include deteriorating forests and former agricultural lands that need to be reforested. Significant areas of private lands that are currently used for other purposes have the potential for forestation. The phaseout of Hawai`i's sugar and pineapple industry also opens up thousands of acres with excellent potential for commercial forest production that could be created by private investment. Additional benefits of forests include nature tourism and ability to recycle sewage effluent.

Flora

All of Hawai`i's endemic (found only here) plant species evolved from ancestors that reached this isolated mid-ocean location by wind or wave or on birds. It is estimated that of the estimated over 1,200 native plant species in Hawai`i, 90% are endemic and 10% are indigenous (found naturally here and in other places).

Endemic Hawaiian plants are highly vulnerable to disturbances as demonstrated by 50% of the flora of the state is consider at risk by state and federal botanists. They are threatened by the high density of feral animals in Hawai`i's watersheds, by wildfires that have resulted from five years of drought, from competition with human introduced, non-native plant species, such as Miconia, that change the forest habitats, as well as by development and encroachment of human habitat. There are an estimated 8,000-10,000 introduced species of plants in Hawai`i.

As of 2002, 283 of Hawai`i's endemic plants are officially listed by the federal government and the state of Hawaii as endangered and over 300 are described as rare or species of concern. DOFAW staff and their cooperators are propagating rare Hawaiian plants in special nurseries, building exclosures around rare plants to protect them from feral animal damage. These cooperators includes organizations such as Lyon Arboretum, Maui Nui Botanical Gardens, National Tropical Botanical Gardens, Bishop Museum, The Nature Conservancy, the National Park Service, with many others. After propagation the rare native plants are then carefully outplanted in protected strategic locations in the hope they will flower, seed and produce seedlings. These efforts can increase the naturally occurring species of rare, endemic plants and result in their removal from the threatened and endangered list.

Fauna

Because of its extreme isolation and lack of ground based predators prior to human introduction, Hawai`i became a home to millions of birds including waterbirds, seabirds, hawks, geese, and other forest birds. Hawai`i's endemic honeycreepers evolved from a single ancestor through reproductive isolation into 50 unique species. Early terrestrial mammals in Hawai`i consisted of the monk seal and the Hawaiian hoary bat. Blown by winds or brought on wings of birds were insects, land snails and other arthropods. It is estimated that there are 5,268 described endemic insects in Hawai`i. Each of these animals played a role in Hawai`i's unique ecosystems.

The first settlers from Polynesia, arriving in approximately 500 AD, introduced small animals such as chickens, rats, pigs and dogs. The birds they found became a food source and were used in other ways, including use of feathers for the manufacture of feather cloaks, capes and helmets. They cleared lowland forests for habitation and agricultural terraces and fields, making use of timber for canoes, houses and other useful items.

While ancient Hawaiians brought pigs (which were mostly kept confined), beginning in the 18th century Europeans introduced other herbivores such as cattle, sheep, goats, deer, horses and new varieties of pigs. Because the introduced ungulates (hooved animals such as sheep, pigs, goats, deer, and cattle) have no natural predators in Hawai`i, they have reproduced pro-

lifically and thus pose a serious threat to Hawai`i's native vegetation. Native plants evolved without any grazing animals and as a consequence of this, developed without the thorns and other defense mechanisms which protect plants on the mainland and other large continental areas. Without these defenses the plants get trampled and/or uprooted or totally denuded of foliage.

Recognizing that an increasing amount of forest and ground cover was being lost due to these introduced animals, many of which had developed large wild (feral) populations, an intensive feral ungulate eradication campaign was conducted by the Territorial government of Hawai`i from 1910-1958 in an effort to protect the watershed.

Other invasive animals that continue to have an impact on Hawai`i's native forests and wildlife are rats, mice, cats, mongooses, insects (such as mosquitoes and ants), and birds.

Each of these introduced species has played a role in reducing the native fauna and flora

. The rats, cats and mongooses, for example, prey on native bird eggs. Mosquitoes spread avian malaria and introduced birds compete with native birds for food and habitat. Dealing with these introduced animals is a challenge facing the DOFAW wild life managers.

In addition to managing the damage wrought by these species, work is currently underway to control invasive alien animal species such as ants, the Caribbean tree frog known as coqui and various escaped pets such as the Jackson's chameleon.

Through constant vigilance and interagency cooperation, the introduction and establishment of the Brown Tree Snake (native to New Guinea and now infesting Guam) and other devastating pests such as the Red Imported Fire Ant have thus far been avoided.

CONCLUSION

The fiscal years 1999-2001 were challenging for the DOFAW. A persistent drought caused large numbers of fires on several islands. Yet at the same time watershed partnerships grew in strength and duration. A new emphasis was placed on the aggressive eradication of invasive species, though resources were financially limited.

PROGRAM OVERVIEWS AND HIGHLIGHTS

WATERSHED PROTECTION AND MANAGEMENT

The goal of the Watershed Protection and Management Program is to ensure viable water yields by protecting and enhancing the condition of Hawai`i's forested watersheds to retard rapid run-off of storm flows, prevent and reduce soil erosion, and improve infiltration rates into Hawai`i's aquifers.

Efforts to to maintain and enhance key watersheds on private lands began to bear fruit as the large scale regional watershed partnerships within the Ko`olau Mountains on O`ahu and the East and West Maui mountains continued to develop during 1998-2001. These watersheds contain much of the best remaining native forests in the state. Watershed partnership programs on Lāna'i and Moloka`i have also been established.

The goal of the State Fire Assistance Program (SFA) is to provide protection for 3,360,000 acres of forest, brush, natural areas, and grassland statewide to hold fire damage below the level at which it would interfere with high-level, sustained yield of products and services from these lands. The program also seeks to minimize human-caused fires by improving the DOFAW's fire prevention program via training and adoption of contemporary techniques for public education measures.

After a severe drought in 1998, during which there were 160 wildland fires, the annual

number of forest fires dropped to approximately 100 in 2000. The DLNR was successful in obtaining federal grants, also shared resources with the counties, for fire management training, community education and firefighting equipment.

NATIVE ECOSYSTEM PROTECTION AND MANAGEMENT

The goal of the Native Resources Protection and Management Program is to protect and enhance the condition of Hawai`i's unique native plant and animal species, and native ecosystems. The program brings inherent value to Hawai`i's citizens, and offers productive value to science, education, industry and the cultural enrichment of future generations.

The Natural Area Reserves System (NARS) is the core of the Native Ecosystem Protection and Management program. The NARS system encompasses 19 reserves covering 109,165 acres, and has an operating annual budget of $483,000. The NARS takes many proactive management actions. NARS erects and maintains fences and access paths, conducts surveys, removes feral ungulates and alien forest predators, eradicates non-native plants and protects rare plants.

During the last three years, the NARS propagated approximately 6,000 rare plants per year, did outplantings in protected enclosures, and maintained the seed banks in rare plant nurseries that have been established on each of the main Hawaiian islands. The outplanting was aided by changes in the DLNR administrative rules in 1998 that now permit the propagation of native plants. In order to protect native plants the DOFAW now maintains 30 miles of ungulate control fence through the NARS.

One of the chief accomplishments in the NARS program during the last three years has been the construction of fences that cross landowner boundaries to keep feral ungulates (such as goats and pigs) out of important watershed areas thus reducing erosion.

The development of watershed partnerships has been an important accomplishment of DOFAW and NARS. The Natural Area Partnership Program and the Forest Stewardship Programs were established in 1991 in an effort to "provide state funds on a two-for-one basis with private funds for the management of private lands that are dedicted to conservation.".

In the year 2000, the Natural Area Partnership Program (NAPP) was expanded to provide year to year funding for watershed partnership programs. As part of a means to provide funding for this program 25% of the conveyance tax on the sale of property in Hawaii was allocated through the Natural Area Reserve Fund (NARF). This not only helped the program grow but enabled managers to leverage federal water and conservation grants.

During the FYs 1999 through 2001, as land values increased, the NARF fund grew from $1,923,175 to $2,627,000. Out of this amount, $400,000 was spent on stewardship programs, $1,000,000 was spent on the creation of watershed partnerships, and approximately $100,000 spent on the **Youth Conservation Corps (YCC)**.

The YCC is an 8-week long hands-on program funded by the NARS that helps young people develop interest in natural resource management careers. In 2001, the YCC attracted the largest number of applicants in its history.

Through partnerships and grants with federal agencies such as the Fish and Wildlife Service, Forest Service, the Navy and Army, Department of the Interior, and non-government organizations such as The Nature Conservancy, this money was leveraged to obtain an additional $3 million dollars in federal funds. DOFAW has used these funds to manage 7 preserves and support 5 watershed partnerships. The 7 projects cover 25,000 acres on Molokaii, Lāna`i and Maui. Cooperating private landowners include The Nature Conservancy, Moloka`i Ranch, Haleakalā Ranch, Maui Land and Pineapple,

AMFAC-JMB and Castle and Cooke. By pursuing grant funding, the DOFAW has been able to pursue its objectives while the Legislature reduces overall funding for the department. However, many of the federal funds have specific requirements, and the DOFAW personnel must sometimes defer work on ongoing state programs in order to fulfill the federal requirements.

FOREST RESOURCES MANAGEMENT

The goal of the Forest Resources Management Program is to broaden the State's economic base by producing, improving, and assisting in the production of high quality forest products to support a sustainable forest industry that maintains and creates jobs while generating revenue for the State of Hawai`i.

Efforts to promote sustainable commercial forestry are ongoing. Approximately 15,000, to 18,000 acres of koa forest statewide are being managed for koa wood harvesting. New endangered species rules allow tree farmers to harvest some endemic species of trees, even if some native plant species have grown up around them.

FOREST STEWARDSHIP PROGRAM

To reforest former pasture lands and promote commercial forestry in Hawai`i, the DLNR granted a Kaua`i farm, Hawaiian Mahogany, $708,000 in 1998 to plant 800 acres of hardwood trees on former sugar lands at Koloa. The company plans to plant a total of 1,600 acres of former Grove Farm sugar land with eucalyptus, koa, mahogany, Brazilian hardwood, Queensland maple and silk oak. The company will pay back a portion of the total funding through the Forest Stewardship Program.

KAULUNANI URBAN FORESTRY

The DOFAW actively supports cultivation of urban forests. Urban forests help make public spaces more livable as they keep cities and residential communities cool, provide welcome shade, and provide aesthetic beauty. The DOFAW's Kaulunani Urban Forestry Program (Figure 13) performs an important function by helping municipalities, state agencies and homeowners plant and maintain tree cover. Between 1998-2001, grants for community forestry projects totaling $207,992 were approved.

WILDLIFE RESOURCES MANAGEMENT

Major programs under wildlife resources include: forest bird conservation, endangered bird propagation, invasive plant and animal mitigation, critical habitat, the landowner incentive program, and hunting.

FOREST BIRD AND RELATED PROJECTS

The Hawaiian Islands are home to species of birds that are found nowhere else on the planet, exhibiting a staggering array of adaptations to life in their unique habitats. Prior to human disturbance, Hawaiian birdlife was abundant from the montane cloud forests to the dry forests by the sea in what are thought to have been the highest densities of any birds on earth. These natural treasures are integral elements of the biological and cultural heritage of the Hawaiian Islands and their people.

Unfortunately, many Hawaiian bird species are highly endangered or already extinct. Of the more than 140 native breeding species and subspecies present prior to the colonization of the islands by humans, more than half have been lost to extinction. Among the remaining 71 endemic forms, 30 are federally listed as endangered, and fifteen of these are literally on the

brink of extinction, numbering fewer than 500 individuals. The causes of these declines are numerous and extensive, including loss and degradation of habitat, and introduced diseases, predators, and competitors. The task of preventing further declines and recovering imperiled species will require wide-ranging efforts to address and mitigate the diversity of threats faced by species in natural populations.

The Division collaborates broadly with government and private researchers, managers, and landowners to implement programs designed to protect and recover Hawaii's unique forest bird species and their habitats. Planning and implementation of this work are multifaceted and complex. The task is further complicated by the fact that 30 bird species or subspecies, each with unique biological attributes and needs, are currently endangered and in need of conservation action. The Division's integrated approach emphasizes basic research to understand the biology of particular species, mitigation and control of threats and limiting factors, restoration and protection of suitable managed habitat, education and outreach, and captive propagation and reintroduction programs. Balancing expenditures among single-species and multi-species approaches, research and management, and habitat protection and restoration remains a long-standing challenge for managers in light of the severe shortage of funding available for the tasks. A multi-species management approach is emphasized while providing support to select single species and research projects. Overall guidance for this work is provided by interagency and landowner working groups, and the Hawaii Forest Bird Recovery Team.

Below is a list of selected projects focusing on forest bird and related projects, representing the range of work that the Division is currently involved in.

Single-Species Projects
-Akiapola`au Population Research and Management
-O`ahu `Elepaio Population Research and Management
-Puaiohi Reintroduction Project
-Maui Parrotbill Reintroduction Project
-`I`iwi Daily and seasonal Movements Research

Multi-Species Projects
-Maui Forest Bird Nest Predation Research

DOFAW ornithologist Dr. Scott Fretz and a female Maui parrotbill.

-Forest Bird Surveys and Monitoring
-Endangered Forest Bird Captive Propagation Program
-Kapāpala Forest Surveys
-Interagency Forest Bird Database Project
-Avian Habitat Use in Koa Plantations Research
-USFWS Hawai`i Forest Bird Recovery Plan

Information and Education
-Kīpuka Rainforest Trail and Interpretive Site

Ecosystem/Habitat Protection and Management
-Kahikinui Koa Forest Restoration
-Pu`uWa`a Wa`a Forest Restoration
-Pu`u Mali and Kaohe Forest Restoration
-Maui Forest Bird Recovery Project

'Alalā, Maui and Kaua`i Partnerships

Bats
-Hawaiian Hoary Bat Research Cooperative

Each of these pages will include information such as:

-Project Description
-Reports
-Collaborators
-Links and related information
-References and related literature

Together these programs are working to recover endangered species statewide through basic research to understand the biology of particular species, mitigation and control of threats and limiting factors, and restoration and protection of managed habitat. Even with this work, however, many species remain at risk due to their small population sizes, limited ranges, and low dispersal rates. The mission of the **Hawaiian Endangered Bird Conservation Partnership** is to contribute to these multifaceted efforts to aid the recovery of native Hawaiian ecosystems and endangered bird species and communities at the landscape-level.

The DOFAW's objectives are to develop and implement programs that integrate captive propagation and reintroduction technology with related work in progress by our organizations and others, including basic research and habitat management.

Another management tool for increasing populations of endangered species of birds consists of **Safe Harbor Agreements**, which are voluntary arrangements between the DLNR, the U.S. Fish and Wildlife Service or the National Marine Fisheries Service and cooperating non-federal landowners. The agreements benefit endangered and threatened species while giving landowners assurances from additional restrictions. In 2000, the Board of Land and Natural Resources approved a safe harbor agreement with Pu'u O Hōkū Ranch on Moloka`i where nēnē were re-introduced. This is the first application of a 1997 state law authorizing endangered species safe harbor agreements.

INVASIVE SPECIES

Control of the rapidly spreading introduced plant miconia has been a goal under the DLNR's **Invasive Plant and Animal Mitigation Program** since 1995. When this popular landscaping ornamental was introduced to Tahiti, it destroyed much of the native understory of Tahiti's forests, creating a monoculture forest of miconia. To prevent this kind of environmental catastrophe in Hawai`i, more than $2.1 million in federal, state and county funds was spent to organize teams to eradicate this pest on each of Hawai`i's islands where miconia has been found. Other invasive plants - such as fountain grass, pampas grass and ivy gourd - were also targeted for eradication. On Kaua`i more than 136 acres of unwanted invasive plants were cleared by the DOFAW invasive species experts working with community volunteers.

CRITICAL HABITAT

To encourage private landowners to help conserve rare species on their land, the DLNR has developed a flexible incentive program that provides financial incentives for private landowners who want to voluntarily manage land for rare species. Hawai`i has more threatened and endangered species than any other state in the nation. While many of these species are difficult to manage, others are relatively easy to help.

This program is being funded through a new national competitive grant program of the U.S. Fish and Wildlife Service, the Landowner Incentive Program. Project proposals from Hawai`i and the rest of the country will be submitted to the U.S. Fish and Wildlife Service for consideration for funding. Exact funding levels for Hawaii will be determined by the Service based on how well the Hawai`i projects compete for funds.

PUBLIC HUNTING

Public hunting is an essential tool in controlling game mammals on public and private lands where control is needed.

The division's public hunting program manages our public hunting areas and wildlife habitat; and provides habitat improvements and facilities to meet the demand for wildlife-oriented recreational activities throughout the state.

The hunting program includes activities to organize and run public hunting seasons, sets seasons and establish hunting rules, monitor hunter harvest, inventory and survey game birds and mammals, sets land leases to provide additional areas available for public hunting, improve game habitat by planting food items and weed control in public hunting areas.

The program also enhances the game population by controlling alien predators, translocating or releasing pen-reared birds; conducting research on game animals and habitat; and developing and operating facility and infrastructure development to improve hunter recreational opportunities.

In addition the program focuses hunting efforts and provides hunter access to more remote/pristine sites, thereby helping to control game mammal populations and their impact in those areas.

Hunters in Hawai`i hunt for feral pigs, feral goats, axis deer anda variety of game birds such as chukar partridges and Chinese ring neck pheasants., wild turkeys and many others. The DOCARE also operates a significant statewide hunter education program. There are an estimated 10,000 licensed hunters in Hawai`i.

OUTDOOR RECREATION

The Outdoor Recreation program responds to increasingly more complicated social issues relating to natural and cultural resource management. The objective is to provide access and opportunities for multiple outdoor recreational activities such as hunting, hiking, fishing, bicycling, equestrian riding and motorized off-road recreation.

Trails and Access Program

Nā Ala Hele (NAH) is the State of Hawai`i Trail and Access program. It was established in 1988 via Chapter 198D, Hawai`i Revised Statutes, in response to public concern about the loss of public access to specific trails and the threat to historic trails from development activity. Since its inception, Nā Ala Hele has shifted from trail development to an emphasis on management and regulatory issues due to increases and changes in both public and commercial recreational activities. There are several evolving issues that the Nā Ala Hele program is addressing. In particular, responding to ecotourism, balancing public access with private land, restoring public use to ancient and historic

Hawaiian trails, and enhancing public recreational safety are just a few of the growing issues that require considerable attention.

Trail and Park User Census/Risk Assessment Training

The DLNR has determined that a formal risk assessment and management plan should be developed for public trails and parks managed by the DLNR. Nā Ala Hele received a $24,000 grant from the Department of Health, through the Tobacco Settlement, to conduct partial census of trail and park users. Data were collected to determine skill levels and environmental conditions. The census and data collection were conducted by students at the University of Hawaii at Manoa, 2000 Fall Practicum of the Department of Urban and Regional Planning. The students interviewed over 2,111 trail users at 14 different features across the state. The DLNR submitted a capital improvement project funding request to the 2001 Legislature for a complete Environmental Risk Assessment.

Students from Kūlia I Ka Pono, a Kamehameha Summer Schools Program, help on a project for Nā Ala Hele on Waimanu trail, O`ahu. .
Photo credit: Curt Cottrell

PLANNING AND INFORMATION SERVICES

The pupose of the planning and information services is to provide proactive direction to the DOFAW programs. They promote community involvement in forestry management.

PROGRAM ACCOMPLISHMENTS, FYS 1999, 2000, 2001

OBJECTIVE: Ensure viable water yields by protecting and enhancing the condition of Hawai`i's forested watersheds to retard rapid run-off of storm flows, prevent and reduce soil erosion, and improve infiltration rates.

ACTION: Prevent and suppress forest and range fires on key watersheds including forest reserves, public hunting areas, and natural area reserves. Cooperate with established fire control agencies for the protection of other wildlands not within departmental protection areas to the extent needed to provide for public benefits and environmental protection.

- Fought 38 fires statewide totaling over 48,000 acres.

- Maintained 57 miles of firebreak roads.

■ Constructed a firebreak road in the Kuaokalā forest reserve, O`ahu.

■ Conducted controlled burns (850 acres) on ranch land adjacent to the Kapāpala Forest Reserve, Hawai`i, to reduce the fire threat.

■ Conducted a statewide series of basic and specialized trainings for department and county fire department personnel (fire operations in the urban interface, advanced wildland fire investigation, command and general staff, bull dozer wildland fire workshop, wildfire powersaw, basic incident command system).

■ Participated in fire prevention education venues with Smokey Bear including classroom visits, county fairs, the Makawao Rodeo, Honolulu City Lights, and the Kailua Fourth of July parade.

■ Conducted in-house inspections of federal excess personal property equipment (total value of $329,958 worth of fire equipment acquired).

■ Provided assistance to the Kaho`olawe Island Reserve Commission in formulating a fuels reduction plan with prescribed fire.

■ Designed the DOFAW Fire Management web site www.state.hi.us/dlnr/dofaw/fmp

■ In addition, to these efforts the DOFAW fire fighters participated in the suppression of five major forest fires in California.

ACTION: Control livestock trespass and non-native animals in priority watersheds.

■ Removed 16 feral cattle from the Pu`u ka Pele forest reserve, Kaua`i.

■ Participated in the eradication of cattle in the Ko`olau, West Maui, and Kula forest reserves on Maui.

■ Conducted aerial eradication of cattle on private land as part of the West Maui Watershed Partnership.

■ Conducted aerial surveys for cattle trespass in state forest reserves on Hawai`i.

ACTION: Survey and control noxious plants, forest insects and diseases that can damage watershed integrity and native ecosystems.

■ Monitored the spread of *Septoria passiflora* fungus to control Banana Poka statewide.

■ Introduced *Septoria passiflora* to other areas that were infested with Banana Poka.

■ Controlled noxious weeds and plants on 136 acres at various locations on Kaua`i.

■ Introduced the bacteria *Ralstonia* for the control of Kahili ginger and monitored the efficacy and spread.

■ Surveyed and removed *Clidemia* plants in the Honolulu watershed forest reserve.

■ Surveyed areas on Maui for parrots, Caribbean coqui frogs, and other alien vertebrates.

■ Conducted forest pest surveys in the Ko`olau, West Maui, and Hāna forest reserves on Maui.

■ Eradicated *Miconia calvescens* on 836 acres of lands in and adjacent to the Hāna forest reserve.

ACTION: Plan for and implement the reforestation and management of deteriorating and/or disturbed state watersheds as may be appropriate for watershed value enhancement.

■ Replanted 1/4 acre of Norfolk Island pine tree seedlings in Kalihi Valley and Waiāhole, O`ahu.

■ Planted 2 acres of seedlings in the Kuaokalā forest reserve for erosion control.

ACTION: Promote, encourage, and advocate for incentives to encourage the maintenance and enhancement of key watersheds on private lands.

■ Participated within the Ko`olau (O`ahu), East Maui, and West Maui Mountains Watershed Partnership programs.

■ Helped establish new watershed partnership programs on Lāna`i and Moloka`i.

ACTION: Review and comment on environmental assessments, environmental impact statements, conservation district use application permits and other land use applications.

■ Wa'ahila Ridge 138kv transmission line by Hawaiian Electric Co., Inc, O`ahu.

■ Saddle Road reconstruction and realignment project by Federal Highways Administration.

■ 115 land use requests for comments to DOFAW.

■ Diamond Head State Monument master plan, DLNR.

■ Kahului flood control project, Kanahā Pond, Maui.

■ University of Hawai`i, Mauna Kea Science Facilities master plan, Hawai`i.

■ O`ahu Forest National Wildlife Refuge by Castle and Cooke, Inc.

NATIVE ECOSYSTEMS PROTECTION AND MANAGEMENT PROGRAM

PROGRAM ACCOMPLISHMENTS, FY 1999, 2000, 2001

OBJECTIVES: (1) Protect and enhance the condition of Hawai`i's unique native plant and animal species, and native ecosystems for their inherent value to Hawai`i's citizens and for their productive value to science, education, industry and the cultural enrichment of future generations. (2) Prevent species extinctions whenever possible.

ACTION: Insure viable populations of native species and increase populations of endangered species by protecting and managing their natural habitats via a system of state-owned and managed sanctuaries, forest, natural area and cooperative managed areas.

■ Outplanted 160 trees in nēnē sanctuaries (Kipuka ʻĀinahou and Pu`u 6677), Hawai`i.

■ Maintained fences and controlled pigs, and conducted weed control on 10 miles of trails in the Hanawī Natural Area Reserve.

■ Inspected and repaired breaks in 55 miles of fencing and constructed water catchment facility to provide a supplemental source of water for fire suppression activities in palila critical habitat.

■ Maintained 3 endangered tree snail sanctuaries in Pahole Natural Area Reserve.

■ Completed 5-acre and 120-acre ungulate-proof fenced units in Manuka NAR to protect existing and outplanted endangered plant species.

■ Completed repairs of 1.5 miles of vandalism on pig-proof fence in Pu`u Maka`ala NAR and resumed animal control via public and staff hunting.

■ Began construction of 3 miles of pig-proof fence to create a 290 acre unit in Pu`u Maka`ala NAR for endangered plant habitat and ecosystem protection.

■ Participated in the `Ōla`a-Kīlauea Management Partnership which is addressing the regional management of biological resources on northeastern Mauna Loa.

■ Completed installation of fence posts along mauka boundary fenceline at Pu`u Wa`awa`a forest bird sanctuary.

ACTION: Conduct an aggressive propagation and re-introduction program for threatened and endangered species (e.g. endangered bird rearing facility, plant nursery and outplanting).

■ Contracted the Peregrine Fund, Inc. and Zoological Society of San Diego to operate and manage the Maui Bird Conservation Center at Olinda and related projects at the Keauhou Bird Conservation Center, Hawai`i. The Hawai`i program maintained 10 bird species in captivity for production or surrogate research. Produced 63 nēnē, 20 puaiohi, 14 palila, 3 Hawai`i creeper, 4 Maui parrotbill, 10 Hawai`i ‘ākepa, 5 ‘alalā, 1 common ‘amakihi, 4 ‘i`iwi, and 6 Hawai`i ‘elepaio.

■ Participated in the logistics for release and follow-up of 19 captive-reared puaiohi on Kaua`i in cooperation with USGS/BRD and the Peregrine Fund.

■ Released 4 captive-reared nēnē goslings in the West Maui Forest reserve.

■ Released 24 captive-reared nēnē into Hanalei National Wildlife Refuge to establish a fourth population on Kaua`i.

■ Reared and protected 17 nēnē goslings in secure habitat at Kea`au, Hawai`i.

■ Increased nēnē numbers from 6 to 24 animals in Kapāpala Cooperative Game Management Area through an aggressive predator control and habitat management program by volunteer hunters.

■ Propagated over 12,000 individual rare plants. Over 9,000 of these plants were returned to their native habitats statewide, covering over 300 rare native species. Excess seeds and propagules were distributed to state cooperators and the public.

■ Maintained and enhanced over 120 plant exclosures on various sites on all islands for protection of Hawai`i's rare plants.

■ Cooperatively constructed 16 new plant exclosures statewide. Kalalau Rim Plant Sanctuary on Kaua`i now provides protection for rare plants occurring naturally at the site and a secure site for 43 outplanted species.

■ Cooperatively funded, managed, and improved three rare plant mid-elevation nurseries on Kaua`i, O`ahu, and Hawai`i. Cooperatively funded and managed Lyon Arboretum Tissue Culture Laboratory as a statewide repository of rare plant material.

■ Assisted Housing and Community Development Corp. of Hawai`i and Department of Transportation in development of Hawai`i's first habitat conservation plan (HCP) for protection of an endangered plant species.

■ Funded captive rearing of endangered tree snails and constructed snail rearing house at Lyon Arboretum.

ACTION: Develop, protect and maintain wetland habitat through management and cooperative agreements with other agencies and private organizations.

■ Conducted semi-annual waterbird censuses on Ni`ihau, Kaua`i, O`ahu, Moloka`i, Maui, Lāna`i, and Hawai`i.

■ Prepared topographic survey and final bottom contour design of Phase II of the Kawaiele Sand Mine Bird Sanctuary development on Kaua`i.

■ Maintained 10 signs, 1 mile of access road, 3000 feet of fenceline, controlled 22 acres of non- native vegetation at Hāmākua Marsh Wildlife Sanctuary, O`ahu.

■ Maintained 1 observation building, parking lot, 1 mile of perimeter fence, 8 signs, four miles of road, deepwell pumps (352 million gallons), and controlled 26 acres of non-native vegetation at Kanahā Pond, Maui.

■ Mowed and maintained waterfowl feeding areas at Kea`au Waterbird Sanctuary and the Keauhou and Kahuku Ranch nēnē sanctuaries, Hawai`i.

■ Controlled vegetation on over 100 acres of wetland habitat at Kawai Nui Marsh.

■ Conducted weed control and trash removal at Paiko Lagoon, O`ahu.

ACTION : Control non-native animal populations at non-damaging levels for unique native species and ecosystems.

■ Increased public hunting for pigs by expanding hunting seasons in watersheds and forest reserves.

■ Conducted aerial shooting of mouflon/feral sheep on Mauna Kea every six months as required by federal court order.

■ Implemented emergency damage control hunt in the Pu`u Wa`awa`a Forest Bird Sanctuary to reduce overbrowsing of vegetation by ungulates in the area.

■ Organized control methods (including public hunting) eliminated 178 pigs, 525 goats, and 25 axis deer from state natural area reserves.

ACTION: Continue to support control of brown tree snake and other alien species by promoting interagency cooperation, expanding the network of volunteers, and updating training and equipment for effective rapid response capacity.

■ Monitored the location of Caribbean frogs and their spread through the Puna and South Hilo districts through a public hotline. Callers were advised on control methods.

■ Responded to and coordinated searches on Hawai`i for six snake alerts with the state Department of Agriculture, vector control branch. Day and night surveillance and baited traps were maintained for at least a week. No snakes were captured.

■ Conducted follow up investigations on 24 alien animal reports: 11 mongoose, 5 snake, 1 iguana, 1 red-vented bulbul, 2 rabbit, 1 Jackson's chameleon, salamanders and 2 "large cats" on Kaua`i. Only one green iguana confirmed by capture.

■ Provided ongoing support for the Maui Invasive Species Committee (MISC), including meeting participation, strategic priority setting, and coordination of funding requests.

■ Assisted with the initiation of the Big Island Invasive Species Committee, assisted in prepara-

tion of its strategic plan, provided participation and logistical support for its ongoing activities, and assisted in its first volunteer control operation.

■ Assisted with the initiation of the O`ahu Invasive Species Committee and assisted in control of fountain grass and Rubus discolor.

■ Participated in a National Invasive Species Advisory Committee to identify and carry out nationwide improvements in federal actions and assistance to states to prevent and mitigate alien species invasions.

■ Implemented rule changes to discontinue the commercial trade in Jackson's chameleons and other injurious wildlife, to prevent further spread of these species in the state.

■ Monitored range and spread of other invasive alien reptiles currently restricted to O`ahu.

ACTION: Support upgrading the Department of Agriculture program to intercept noxious plant and animal species coming into Hawai`i.

■ Supported the Coordinating Group on Alien Pest Species (CGAPS), assisted with hiring a CGAPS coordinator, led CGAPS assessment of capacity needs to provide Hawai`i effective and comprehensive alien-species prevention and control programs.

■ Continued participation in the Alien Species Advisory Committee to the Kahului Airport expansion. Assisted in assessment of pest risks at the airport, devised baseline surveys on airport grounds for alien organisms, and re-designed the declaration forms for arriving passengers.

ACTION: Manage the State Seabird Sanctuary system and other seabird nesting colonies by controlling predators, enhancing nesting habitat, salvaging and rehabilitating grounded seabirds, and enforcing wildlife sanctuary rules.

■ Assisted contractor A.B.R. Inc. to survey and monitor population trends of threatened and endangered seabirds using marine radar at 16 sampling stations on Kaua`i. Trend continues to decline.

■ Conducted "Save Our Shearwater" program on Kaua`i, recovered 1,467 birds, of which 1,350 were banded and successfully released to the wild.

■ Installed windows and new roof cement in the Kure Atoll field camp building, assisted with cleanup and damage assessment from the shipwreck of a commercial fishing vessel which ran aground on Kure Atoll.

■ Conducted survey of 16 seabird and 4 migratory shorebirds species at Kure Atoll. Banded seabird chicks and recorded number and cause of mortalities. Stationed an intern at Kure Atoll for three months to control vegetation and provide suitable nesting habitat for 16 species of seabirds.

■ Surveyed O`ahu Offshore Island State Seabird Sanctuary islands for seabirds and made 70 incidental monitoring trips to assess habitat conditions and possible threats to the sanctuary. Banded nesting birds and chicks, controlled weeds, removed trash and entanglement hazards (e.g. 30 lbs. of drift net).

■ Banded 401 seabirds and released 40 seabirds on Maui. Formally censused Huelo and Mōkapu islets for birds.

ACTION: Protect native species and their habitats through predator control and other improvement activities.

■ Maintained 3 predator control grids in po`ouli habitat in Hanawī Natural Area Reserve.

■ Controlled rats in three state-owned forest reserves during the O`ahu ‘elepaio (*Chasiempis sandwenchenis ibidis*) nesting season in an attempt to increase nesting success.

■ Continued rat control/monitoring operations at Kure Atoll to detect any remnant rat populations remaining on the island after a rat eradication project implemented in 1993.

■ Controlled predators in sanctuaries on Hawai`i using live traps and toxicants. Removed a total of 277 mongooses, 31 cats, 7 dogs and 5 ‘auku`u. Operated 300 bait stations to control rats and mice.

■ Removed gorse from the Kīpuka ‘Āinahou nēnē sanctuary where it had begun to spread from infestations on the upper slopes of Mauna Kea.

■ Controlled predators at Kanahā Pond Waterbird Sanctuary on Maui. Removed 60 cats, 9 rats, and 2 mongoose using live traps. Operated 82 bait stations for mongoose and rat control.

■ Controlled predators at Hāmākua Marsh, O`ahu using live traps and poison bait blocks. As a result, one Hawaiian stilt chick, four Hawaiian gallinule chicks, and one koloa duck chick fledged from the area.

■ Conducted a predator impact study at Mālaekahana State Recreation Area to quantify the effects of small mammal predators (dogs, cats and mongooses) on wedge-tailed shearwater nesting colonies.

■ Predator control increased albatross numbers at Ka`ena Point from 3 in 1995 to 22 in 1999 and nēnē at Kapāpala from 6 in 1997 to 27 in 2000.

■ Participated in organized statewide actions to obtain an EPA registration for aerial broadcast of rodenticide for control of rats, mice, and mongooses in natural areas of importance for endangered native birds. Activities included funding studies and organizing the research program to obtain the data needed to justify and defend an aerial broadcast registration.

ACTION: Maintain facilities, improvements, signage and access to forest reserves, sanctuaries, and natural area reserves.

■ Maintained 30 miles of existing ungulate control fence throughout the Natural Area Reserves System with 3 miles constructed at Pu`u Maka`ala NAR.

■ Removed the remnants of the Kahuku cabin from the Ko`olau Mountains.

■ Constructed and maintained boardwalks in Alaka’i Wilderness and Ka`ala NAR.

■ Maintained vehicle barriers at Ka’ena Point and ‘Āhihi-Kīna`u NAR to protect natural and cultural features from off-road damage.

■ Completed the construction of a management cabin to serve as a base of operation for resource management crews in the central Ko`olau Mountains, O`ahu.

■ Constructed a picnic site which included a bathroom with composting toilet and tool storage room near the Ka`ala NAR for use by volunteers and researchers.

ACTION: Develop and acquire new management techniques and equipment for managing and monitoring native ecosystems, including alternative techniques for introduced animal and plant control.

■ Funded development of release techniques for

endangered puaiohi on Kaua`i. Released 14 captive-reared puaiohi in Alaka`i Swamp.

■ Started discussions with private landowners on development of safe harbor agreements to allow reintroduction of endangered nēnē into former range on private lands.

■ Funded research study on potential affects of diphacinone toxicant on non-target and protected birds to support development of a broadcast registration of this toxicant to control rats in native ecosystems. Conducted 2 field trials of the efficacy of diphacinone bait blocks on mongoose removal. Trials involved trapping, marking, radio collaring and releasing individual animals, followed by a three week baiting period, and finally, a follow up trapping period to determine bait efficacy.

■ Initiated field trials in Pu`u Wa`awa`a Forest Bird Sanctuary, Hawai`i of a new technique for the simultaneous monitoring of ungulate density and their impact on vegetation at varying densities.

■ Helped establish statewide monitoring/survey methods and documentation forms for critically endangered plants species in conjunction with the Hawai`i Rare Plant Restoration Group.

■ Upgraded GIS computer mapping capabilities for long term monitoring and mapping of both threatened and endangered species and ecosystems including threats to populations.

■ An effective herbicide technique was discovered for the removal of red mangrove at Hāmākua Marsh, O`ahu. Trial plots were established to track the effectiveness over time on different tree sizes and stand densities.

■ Conducted vegetation control trials at Green Island, Kure Atoll to determine a methodology for control of Verbesina, which has overrun a majority of the island.

ACTION: Conduct surveys of rare and endangered plants and wildlife and monitor the effects of management activities.

■ Conducted island wide surveys for endangered nēnē on Kaua`i, Maui and Hawai`i.

■ Assisted National Parks Service with surveys for forest bird in Haleakala National Park.

■ Assisted USGS/BRD with surveys for endangered puaiohi in Koai'e Stream area of Alaka`i Swamp.

■ Monitored nesting success of the O`ahu 'elepaio *(Chasiempis sandwenchenis ibidis)* in areas with and without predator control to remove rats. Predator control increased nesting success 100%.

■ Conducted a comprehensive forest bird survey on 26 transects in the Alaka`i Wilderness Preserve with cooperators of USFWS and USGS/BRD. Of the six endangered Kaua`i forest birds, only the puaiohi was found. Emphasis was placed on determining of the status of 'akikiki, and Kaua`i 'ākepa, species of concern.

■ Assisted U.S. Army in island wide surveys of threatened and endangered plants on O`ahu as part of Mākua mitigative measures.

■ Assisted the National Tropical Botanical Garden in statewide survey/monitoring of critically endangered plants as part of USFWS Emergency Measures Project.

■ Monitored 55 miles of ground-based ungulate and weed transects throughout the NARS system. Established 9 miles of new transects.

■ Jointly conducted 10 separate endangered tree snail surveys in the Wai`anae and Ko`olau mountains.

ACTION: Maintain awareness and promote dialogue to balance the differing the DOFAW mandates of protecting native ecosystems and providing recreational hunting opportunities.

■ Participated in a number of facilitated working groups to allow increased input by all concerned parties dealing with hunting issues on state lands (Moloka`i Hunter working group, the Maui Axis deer group, and the natural area working group (Puna and Kohala regions of Hawai`i).

■ Provided logistic support and met four times with the Hawai`i Hunting Advisory Council to discuss management of recreational hunting and how it is integrated in the department's overall management program.

■ Developed management guidelines and distributed for public comment.

ACTION: Administer the Natural Area Partnership Program (NAPP).

■ Provided matching funds and administered program for the management of natural resources on private lands permanently dedicated to conservation. This encompasses 7 projects covering 25,000 acres on Moloka`i, Lāna`i, and Maui. Cooperating private landowners include The Nature Conservancy, Moloka`i Ranch, Haleakalā Ranch, Maui Land and Pineapple, Amfac JMB, and Castle and Cooke.

ACTION: Promote and encourage meaningful applied research that addresses endangered species and natural area management needs and concerns such as limiting factors or critical habitat needs for endangered plant species.

■ Issued 32 research permits for threatened and endangered plants, 72 research special use permits in the NARS and 55 permits allowing commercial sales of threatened and endangered plants from cultivated sources.

■ Conducted research on avian disease to investigate the transfer of avian malaria antibodies between mother and offspring.

ACTION: Develop contingency plans and capacity to rehabilitate wildlife impacted by oil spills and other emergencies.

■ Participated in oil spill response and clean-up of Tesoro Single Point Mooring Hose Spill, of September-October 1998. Treated 34 birds for exposure.

■ Participated in Kure Atoll spill response and clean up in October 1998.

■ Participated in the spill response and clean up of the fishing vessel Van Loi grounding on Kaua`i and the spill of 16,000 gallons of diesel fuel in April, 1999.

■ Participated in oil spill response and clean-up of a 4,000 gallons of JP5 jet fuel spill at Kāne`ohe Marine Corps Base Hawai`i.

■ Participated in Pearl and Hermes Atoll spill response and clean up.

■ Participated in 4 oil spill drills (Maui Electric Co., Hawai`i Electric Co., Tesoro Hawai`i Co., Chevron Co.).

■ Treated 13 birds and 1 bat turned in for animal rehabilitation.

OUTDOOR RECREATION PROGRAM

PROGRAM ACCOMPLISHMENTS FYS 1999, 2000, 2001

OBJECTIVES: (1) Enrich leisure time and capabilities of Hawai`i's residents and visitors by providing opportunities and facilities for multiple outdoor recreational activities such as hiking, hunting, fishing, bicycles, equestrians and motorized off-road recreation. (2) Maintain trail and access systems for wildland fire control, search and rescue, watershed protection, and other natural resource management activities. (3) Maintain and enhance where possible, a public hunting program of recreational, subsistence, and traditional hunting methods to provide a source of food and outdoor recreation for the public and as a means to manage and control introduced game animals.

ACTION : Maintain and construct roads and trails to allow managed public use of recreational areas.

KAUA`I

■ Maintained 59 miles of trails, 23 miles of roads, 0.2 miles of fences, 29.5 miles of foot trails and 28 miles of jeep roads in public hunting areas.

■ Designed three drizzle herbicide spray units for trail maintenance with the assistance of UH Extension Service.

■ Repaired 2 miles of the Wailua forest management road.

■ Established a trail monitoring program for all commercially used trails.

■ Expanded trails volunteer work program:

- 48 hours of volunteer from Boy Scout Troop 148 installed quarter mile marker on the 'Okolehao Trail, Hanalei.
- Kaua`i Sierra Club adopts 'Okolehao Trail.
- 96 hours of volunteer time was expanded on the Nu'alolo Cliff Trail.

■ Volunteers from the Kaua`i Resource Conservation Program did 93 hours of weed control work at Pihea Trail.

O`AHU

■ Maintained 27.2 miles of trails and 38.8 of access roads.

■ Provided 12 portable toilets and erected 25 miles of fence line at the Kahuku motorcross park.

■ Established connector/reroute trail between two trails in Makiki Valley.

■ Installed 57 recycled retention safety steps, three benches; and graveled over 150 yards of damaged and slippery trail conditions.

■ Utilized 857 volunteers for 3,936 person hours on various trail restoration projects.

■ Conducted trail-head monitoring for use surveys.

■ Replaced damaged wooden steps with recycled plastic steps and rebuilt trail segment at Mānoa Cliff Trail.

■ Added 13 new recycled plastic steps in steep, eroding areas and applied gravel at Mānoa Falls Trail.

■ Replaced four signs and added five new signs within the Tantalus Mauka trail system.

MAUI

■ Maintained 70.5 miles of trails on Maui and Lāna'i.

■ Maintained 65.9 miles of access roads on Maui and 86.4 miles of access roads on Moloka`i.

HAWAI`I

■ Maintained 15 miles of trails and 50 miles of access roads.

■ Mowed roads within Pu`u 'Anahulu and Pu`u Wa`awa`a public hunting areas to reduce grass fires from four wheel drive vehicle catalytic converter s.

■ Surveyed hunter access to portions of the Hāmākua Forest reserve to recover lost and obscure easements resulting from the sale of former sugar plantation lands.

■ Helped fund construction of a concrete ford at the Wailuku River headwaters on the Mānā Road.

ACTION: Protect ancient and historic trails and accesses.

■ Conducted over 100 abstract requests to determine title and/or public access for historic trails, old government roads and lateral shoreline access routes.

■ Collaborated with the Nā Ala Hele Advisory Council with various land development projects to preserve the Ala Kahakai and various other state-owned historic trail alignments.

■ Completed cultural assessment - mitigation plans for portion of the Puna Trail and portion of the Ala Kahakai.

ACTION: Conduct public hunting seasons, inventory and conduct surveys of game birds and mammals, and evaluate hunter harvest for setting seasons and rules, and manage public hunts.

KAUA`I

■ 19,121 game mammal hunter trips on Kaua`i yielded a harvest of 1,068 feral pigs, and 1,434 feral goats. 1,954 game bird hunter trips yielded 568 game birds.

■ Manned hunter checking stations for 19 week-ends during special hunts, and conducted three public drawings to distribute hunting pressure for hunter safety.

■ Established 21 new photo stations and vegetation transects in feral goat habitat on the Nā Pali Coast and in Waimea Canyon. Conducted two aerial censuses of feral goats.

■ Analyzed 44 deer browse survey transects, assessed feral pig impact on 26 transects in Alaka'i wilderness preserve and Nā Pali Kona forest reserve. Visited eight feral goat exclosures, assessed effects of drought on feral goat, black-tailed deer and range conditions.

O`AHU

■ Completed two helicopter surveys to assess feral goat populations in Mākua-Kea'au and Wai`anae Kai public hunting areas.

■ Completed 4 game bird surveys to assess distributions and abundance of game birds in the Kuaokalā game management area.

■ Conducted, in cooperation with USDA Wildlife Services Branch transect surveys in 10 public hunting areas to quantify feral pig populations and radio telemetry studies of feral pig movements in the Kuaokalā GMA. Six pigs were radio collared and tracked for a period of six months to determine home range.

MAUI

■ 376 hunters removed 699 axis deer, 532 mou-

flon sheep, 422 pigs and 105 goats on 4,745 hunter trips during game mammal hunts. Gamebird hunters took 317 gamebirds on 309 hunter trips.

HAWAI`I

■ Captured six feral sheep and outfitted them with radio transmitters to gather information on their movements in and around the Pu`u ‘Anahulu and Pu`u Wa`awa`a public hunting areas.

■ Installed photo stations and plant enclosures in Pu`u ‘Anahulu and Pu`u Wa`awa`a public hunting area to monitor changes in plant composition over time.

■ Conducted browse surveys to monitor browse utilization by feral sheep in the Pu`u Wa`awa`a public hunting area.

■ Enlisted hunters and their bird dogs to conduct preseason forecasts of the fall game bird season.

■ Conducted wild turkey gobble counts to monitor presence and densities of tom turkeys in various public hunting areas.

■ Utilized electronic feeder, infrared game counter/camera, and rocket net to capture and mark wild turkeys in the Ka`ohe GMA. The birds were banded and outfitted with radio transmitters to monitor their daily/seasonal movements, nesting success, and habitat preference.

■ Utilized volunteers to gather harvest data at hunter checking stations during game bird and mammal seasons.

■ Approximately 1,539 hunter trips were taken each year into public hunting areas for big game. Another 1,617 trips were made by hunters into game bird hunting areas.

ACTION: Construct and maintain forest and wildlife recreational facilities such as trail shelters, arboreta, picnic grounds, viewpoints, signs, bridges and campgrounds.

KAUA`I

■ Maintained 30 picnic and trail shelters and 284 acres of arboreta.

O`AHU

■ Maintained campgrounds A and B in the Mokulē`ia forest reserve, 16 picnic shelters in the Ko`olau and Wai’anae mountains, 3 composting toilets in campgrounds, and 120 acres of arboreta.

■ Constructedt and maintained 2 gates and mileage markers for the Mokulē`ia forest reserve.

■ Installed 80 trail advisory signs.

MAUI

■ Maintained 72 acres of arboreta and constructed new plant identification signs and installed them in the Ke`anae arboretum and along the Waikamoi ridge trail.

■ Maintained Waikamoi, Puohokamoa and Haipua`ena stream recreation areas, and the Waikamoi ridge trail viewpoints on Maui.

■ Maintained the Waikolu pavilion, the “Sandalwood pit” and Waikolu lookouts on Moloka`i.

HAWAI`I

■ Installed warning signs at Hā`ena Beach and Pololū Valley.

■ Maintained 60 acres of recreational facilities including 9 campsites, 2 trail shelters, 4 Clivus systems and 1 outhouse for public use.

ACTION: Improve game wildlife populations and habitat by planting food crops, control of noxious vegetation and predators, and restocking

of game birds where appropriate.

KAUA`I

■ Cleared 153 acres of range land infested with brush and weed in Kekaha GMA, seeded 155 acres with Pensacola Bahia grass and/or Bermuda grass to improve game bird habitat.

■ Imported 1,050 game farm pheasant chicks for brooding, rearing and release at Kekaha GMA to improve game bird hunting.

■ Began plans and environmental assessment for proposed Hanahanapuni rifle range and Umauma field archery range.

O`AHU

■ Installed 0.5 miles of fence line to allow rotational grazing to keep vegetation levels manageable and enhance game bird habitat.

■ Mowed 12 acres to improve both game bird habitat and hunter access.

■ Controlled predators using live trapping and shooting, under contract to the USDA Wildlife Services Branch (6 wild dogs, 80 feral cats and 1,441 mongooses were removed in the Kuaokalā and the Mākua-Kea`au public hunting areas).

HAWAI`I

■ Mowed approximately 200 acres in public hunting areas to enlarge wildlife openings and enhance utilization by game birds and mammals.

■ Planted approximately 2,000 mamane, naio, and ‘ulei seedlings in Pu`u Wa`awa`a Cooperative Game Management Area.

■ Maintained experimental mamane tree plot in Pu`u ‘Anahulu GMA.

■ Released 200 pheasants with the cooperation of the Big Island Bird Hunters club into the Kapapala Cooperative Game Management area.

ACTION: Construct and maintain hunter checking stations, wildlife water units, hunter informational, boundary, and safety zone signs, and game feeding sites and signs for hunter education, hunting area boundaries and safety zones.

KAUA`I

■ Constructed four hunter shelters, with fire rings and water tanks in Mokihana Ridge GMA to increase hunter access to remote parts of Hunting Unit E.

■ Posted 259 new hunting area management signs.

■ Managed 17 hunter checking stations, two game bird feed sites, 37 game water units, and 1.5 miles of fenced exclosures.

■ 55 volunteers provided 506 hours manning hunter checking stations, posting signs, distributing game feed, attending hunter meetings, planning rifle range development, processing game tags, assisting with game operations, and rearing and releasing game birds.

O`AHU

■ Maintained 22 game bird water units, 10 miles of access roads at Kuaokalā GMA.

■ Constructed 2 additional game bird water units and 2 game bird release pens to enhance game bird hunting opportunities.

■ Monitored 12 hunter check stations each month to collect hunter effort and success data from each area.

■ Digitized topographical map s of O`ahu public hunting areas were produced as 24”x36” signs, and were posted at each hunter check-in station.

■ Two helicopter surveys were done in the Mākua-Kea`au public hunting area to assess goat

population trends and resource impacts.

■ The DOFAW staff and volunteers installed 10 information signs at the entrance to five O`ahu public hunting areas.

MAUI

■ Maintained 69 hunter check stations, and 390 boundary informational or safety zone signs in game management areas and forest reserves.

HAWAI`I

■ Maintained and serviced 11 hunter check-in stations, 52 feeding stations and watering units and 107 signs identifying public hunting areas.

■ Constructed a new hunter checking station at Pu`u Wa`awa`a Ranch.

■ Maintained and serviced 10 hunter check-in stations.

■ Constructed or renovated 9 game bird guzzlers in Ka`ohe/Mauna Kea GMAs utilizing donations/contributions from hunting organizations and local merchants.

■ Installed 10 new signs on game bird guzzlers acknowledging sponsors.

■ Installed 2 miles of poly-pipe in Pu`u Wa`awa`a public hunting area to transport ranch well water to game guzzlers.

■ Built a new hunter check-in station at Kapāpala Cooperative Game Management with materials and labor donated by bird hunters.

ACTION: Advocate for public access by commenting on development plans and forming agreements with private landowners to increase public use of trails and accesses.

KAUA`I

■ Continued working on acquiring public access in Moloa`a, Kaholalele Road and the Old Cart Road.

O`AHU

■ Finalized parking and public access through the private subdivision of Wai`alae Iki V for the Wiliwilinui trail.

MAUI

■ Negotiated with developers of a new subdivision for re-alignment and management of a portion of the historic Hoapili trail.

HAWAI`I

■ Continued collaboration of the Nā Ala Hele Advisory Council with Oceanside 1250 for the restoration of the Keauhou-Nāpō`opo`o trail alignment and preservation of the Old Cart Road, and the Sea Cliff Development to preserve the coastal trail alignment.

■ Provided comments on the draft environmental assessment for the Keōpuka Lands proposed development relating to state ownership and public use of the Keauhou-Nāpō`opo`o trail and the Old Cart Road.

■ Resolved a Kīholo land exchange and obtained concessions to restore segment of the Huehue- Kīholo Trail and a single family residential construction at Kona Paradise Subdivision to preserve segment of the Ala Kahakai.

ACTION: Provide additional hunting opportunities by developing new public hunting areas and creating incentive program to encourage more hunting on private lands.

HAWAI`I

■ Built a multi-purpose 800,000 gallon reservoir at Kapāpala Ranch with cooperation of ranch management, hunters and wildlife branch personnel. The facility is designed to benefit both wildlife and livestock.

■ Revegetated 600 acres of pastureland with legumes to benefit livestock and wildlife. Constructed 3 exclosures totaling 1.5 acres for food crop plantings to benefit game and non-game wildlife in Kapāpala Ranch.

■ Offered game bird and game mammal hunting opportunities to hunters 15 years old (when accompanied by a licensed adult) in various public hunting areas.

■ Increased spring bearded turkey season from 21 days to 31 days in March.

■ Organized a cooperative hunting program with ʻOʻōkala Dairy on state lease lands at ʻOʻōkala and Humu'ula.

ACTION: Develop responsible mechanisms to manage commercial uses on Nā Ala Hele trails, such as to encourage ecotourism in ways that sustain the natural resources and provide benefits to the local community.

■ Established the commercial trail tour activity (CTTA) permit as a mechanism to regulate amounts of commercial tours on trails and access roads regulated under Title 13-130, Nā Ala Hele administrative rules.

■ Issued 11 permits that generated approximately $17,000 in revenue. Established commercial trail monitoring sites on Kauaʻi and Maui to measure for changes to trail surface.

■ Initiated the design and construction of an automated commercial reservation system and public Nā Ala Hele website site, accessible through the internet and telephone. Funding for this project is from a contract and grant from the Hawaiʻi Tourism Authority, with matching funds through the Federal Recreational Trails Program.

FOREST RESOURCES MANAGEMENT

PROGRAM ACCOMPLISHMENTS, FY 1999, 2000, 2001

OBJECTIVE: Broaden the State's economic base by producing, improving, and assisting in the production of high quality forest products to support a sustainable forest industry that maintains and creates jobs while generating revenue for the State of Hawaiʻi.

ACTION: Encourage private investment for commercial forest development.

■ Participated in the Hawaiʻi Forestry and Communities Initiative, which has grown from the eight founding member government organizations in 1997 to 35 public and private participants in 1999.

■ Produced a timber inventory for degraded koa lands in Honomalino in cooperation with The Nature Conservancy of Hawaiʻi.

■ Enhanced marketing opportunities for Hawaiʻi's existing industry by co-sponsoring a branding program (Hawaiʻi's Wood(tm)), co-funding the hiring of a marketing coordinator, and commissioning an intensive study on the international competitiveness of eight tree species found in Hawaiʻi.

■ Coordinated the development and funding of a comprehensive, multi-focus training program to improve forest industry member skills in reforestation, road building, and logging.

ACTION: Plan and administer commercial forest management on state land which includes

resource inventory and forest product sale administration.

■ Conducted timber mapping and inventories on approximately 32,510 acres of state and private lands, identifying millions of dollars of timber and giving landowners new management options. The Waiakea Timber Management inventory was used to advertise the first large state timber sale in 20 years.

■ Produced timber inventory and maps in cooperation with Department of Hawaiian Home Lands for Humu`ula/Upper Pi`ihonua tracts on Hawai`i.

■ Remeasured 30 long-term growth plots and 20 regeneration plots.

■ Sold $ 62,405 worth of forest products, including 34,000 board feet of eucalyptus, and nursery seedlings.

ACTION: Provide private landowners and processors of forest products with technical forestry assistance.

■ Involved hundreds of landowners, businessmen, community leaders, government agency representatives, and citizens in learning about the positive benefits of forestry and participating in its development. Co-sponsored the 1998 Forestry Symposium (143 participants), the 1999 Hamakua Community Logging Workshop (108), the 1999 Carbon Sequestration Workshop (85), and the 2000 Forestry 2010 Conference (134).

■ Established an extension forestry program at University of Hawai`i-Mānoa - a first for the State. Dozens of relevant forestry documents have been catalogued and distributed to landowners and managers needing forestry extension materials. Cooperative agreements between the University and the private sector have resulted in pooled resources for five demonstration projects on two islands and three public information workshops.

■ Made all timber inventory results available on DOFAW's web site.

■ Provided technical forestry assistance to 529 landowners.

ACTION: Administer state and federal cost sharing programs such as urban forestry and forest stewardship.

■ Provided urban and community assistance to 72 individual homeowners and groups.

■ Awarded $291,000 to 21 landowners enrolled in the State Stewardship Assistance Program

■ Approved five Forest Stewardship Management Plans bringing an additional 3,761 acres under Program management.

■ Provided $207,992 to 72 participants in the Kaulunani (Urban and Community Forestry) program.

ACTION: Operate the central tree nursery in Kamuela and district nurseries for distribution of high quality tree seedlings for reforestation, special use plantings such as windbreaks and propagation of native plants for outplanting.

■ Produced 228, 953 tree seedlings statewide for timber, windbreak, erosion abatement, etc. purposes.

PLANNING AND INFORMATION SERVICES

PROGRAM ACCOMPLISHMENTS FY 1999, 2000, 2001

OBJECTIVE: Develop volunteer and information programs for natural resource management that allow meaningful and productive community involvement in the stewardship of natural resources on public lands.

ACTION : Develop a website that will give the public easy access to information about the DOFAW, ongoing division projects, and basic conservation information.

■ Developed the DOFAW web site http://www.state.hi.us/dlnr/dofaw

■ Created and continue to support an extensive, comprehensive, interactive internet information site at hawaii-forest.org and www.state.hi.us/hfciforest

■ Created and maintain web site for Nā Ala Hele Trails and Access Program at www.hawaiitrails.com

ACTION : Work with the Native Hawaiian community to develop appropriate protocols for sustainable traditional and cultural gathering.

■ Issued first special use permit allowing the practice of traditional fishing within the boundaries of Āhihi-Kīna'u NAR.

ACTION: Encourage private citizens to work on natural resource management projects by supporting community volunteer programs.

■ Began a long term community forestry project at ʻOʻōkala, Hawaiʻi on former sugar lands involving local high school students, teachers, and community leaders in the design, establishment, and management of the forest.

■ Expanded trails volunteer work program on Kauaʻi:

■ 48 hours of volunteer from Boy Scout Troop 148 installed quarter mile marker on the ʻOkolehao Trail, Hanalei.

■ Kauaʻi Sierra Club adopts ʻOkolehao Trail.
■ 96 hours of volunteer time was expanded on the Nualolo Cliff Trail.

■ 93 hours of volunteers from the Kauaʻi Resource Conservation Program did weed control work at Pihea Trail.

■ Utilized 857 volunteers for 3,936 person hours on various trail restoration projects on Oʻahu.

■ Enlisted hunters and their bird dogs to conduct preseason forecasts of the fall game bird season. and volunteers to gather harvest data at hunter checking stations during game bird and mammal seasons on Hawaiʻi.

ACTION : Develop information and educational materials on division's programs such as maps, reports, brochures, teacher's packets, videos, and posters.

■ Helped develop an educational curriculum in tropical forestry at the newly named University of Hawaiʻi at Hilo College of Agriculture, Forestry and Resource Management by partially funding an eight-course certificate program in forestry. Currently 17 students are enrolled in the program.

■ Created signage about coastal plants and wildlife for Kaʻena Point Natural Area Reserve.

■ Created and distributed forest bird exhibit for use at schools and public events statewide.
■ Represented DLNR at 18 environmental fairs and festivals statewide.

■ Produced all maps for the DOFAW public hearings statewide.

OBJECTIVES: (1) Formulate and provide planning processes appropriate to fulfilling programmatic responsibilities. (2) Provide administrative support services that coordinate and manage the division's fiscal, budgetary, infrastructure, personnel, and contracts administration requirements.

ACTION: Formulate and advocate program goals, policies, and plans.

■ Produced evaluation of sustainable forestry report entitled: Criteria and Indicators for Sustainable Forest Management in Hawai`i.

■ Facilitated production of management guidelines for Division of Forestry and Wildlife.

■ Instrumental in planning and implementing Public Safety Wireless Network (PSWN) radio system planning workshop in Honolulu.

■ Produced 189 maps supporting the division's resource management programs.

ACTION: Develop alternative sources of revenues for management programs.

■ Instrumental in securing $1.2 million Gap Analysis Program (GAP) funding for identifying and protection of biodiversity in Hawai`i.

ACTION: Administer federal cost sharing programs and other relevant grant requests.

■ Refined database program and complied all timesheet reports within the division.

ACTION: Develop and manage technology appropriate to support planning and operational needs.

■ Planned and implemented office network, incorporating e-mail and internet access for all administative staff.

ACTION: Provided needed repair and maintenance of facilities.

■ Installed emergency power generator and building repairs to Mauna Loa microwave radio site.

FIGURE 7. Forest and Brushland Fires in Mutual Aid Protection Areas

	Hawaii			Maui/Molokai			Oahu			Kauai		
	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000
TOTAL NO. OF FIRES	106	69	54	66	29	48	24	9	4	9	25	19
No. of Fires by Cause												
Lightning	0	1	1	0	0	0	0	0	0	0	0	0
Campfire	0	1	0	5	1	3	0	0	0	4	1	0
Smoking	5	3	6	11	2	6	0	0	0	0	0	1
Incendiary	27	20	12	21	4	4	0	0	0	1	3	2
Debris burning	20	7	10	6	3	7	0	1	0	2	2	5
Equipment Use	11	3	9	4	5	2	0	0	0	0	0	0
Children w/Matches	8	4	4	1	0	9	0	0	0	0	0	0
Miscellaneous	35	31	12	18	14	17	24	8	4	2	19	11
No. of Fires by Size-Class												
0 to .25 acre	22	15	13	39	19	32	0	1	0	5	14	3
0.26 to 9 acres	55	44	34	14	6	12	4	3	0	1	9	14
10 to 99 acres	13	7	3	6	3	3	19	5	4	3	2	2
100 to 299 acres	8	0	1	1	1	1	0	0	0	0	0	0
300 to 999 acres	4	1	2	4	0	0	0	0	0	0	0	0
1000 to 4999 acres	4	1	1	1	0	0	1	0	1	0	0	0
More than 5,000 acres	0	2	0	1	0	0	0	0	0	0	0	0
TOTAL ACRES BURNED:	16385	19920	2556	18411	395	243	2334	70	40	104	72	94

FIGURE 8.

Reforestation Program in State Forest Reserves

	Acres of Accomplishment						
Island - 98	Site Prep	Planting	Replanting	Weeding	Fertilizing	Pruning	Thinning
Hawaii	90	66		85	145		
Island - 99							
Hawaii	6	7		23	63		
Island - 00							
Hawaii	20	20		0	8		

Seedlings Produced and Distributed	FY1998	FY1999	FY2000					
Scientific Name (Common Name)								
Acacis koa (Hawaiian koa)		40594	25432					
Acacis koaia		3135	5478					
Casuarina spp. (Ironwood)		14473	32552					
Cupressus spp. (Cypress)		8020	13088					
Eucalyptus spp.		6144	8820					
Lophostemon confertus (Brushbox)		570	1974					
Melaleuca leucadendron (Paperbark)		1730	3950					
Okea europea (Wild Olive)		1360	3873					
Pinus spp. (Pine)		5875	19457					
Sapindus saponaria (Manele)			6					
Sophora chrysophylla (Mamane)		1660	1020					
Toona australis (Australian toon)		1850	9674					
Other			240					
Subtotal	585776	85411	125564	Kamuela	Kauai	Oahu	Maui	HI
	*spp. Breakdown not available for FY98							

Community Beautification & Native Species Seedlings			
Ornamental and Exotic Species	4888	2800	4250
Native Species	4406	10710	5818
Subtotal	9294	13510	10068
Grand Total	595070	98921	135632

	FY1998	FY1999	FY2000					
	Total							
FY98 ornamental	4888			2000		800	2088	9776
FY99 ornamental	2800			2000		800	0	
FY00 ornamental	4250			2000	450	800	1000	
				6000		2400	3088	
FY98 native	4406			3000		500	3906	
FY99 native	10710			3000		500	7210	
FY00 native	5818	720	104	3000	1318	500	1000	
				9000		1500	12116	

Editor's note: A steady decline in reforestation during the period 1998-2001 is due to three reasons: a decline in funding for tree planting, a lack of available workers and a reluctance to clear additional lands for tree planting due to the need for removal of native plants in the site preparation process.

FIGURE 9.

Game Mammal and Bird Harvest on Public Hunting Areas

98-99

	Hawaii	Maui	Lanai	Molokai	Oahu	Kauai	Total
Feral Pig	728	260		47	200	603	1838
Feral Goat	237	69		61	141	739	1247
Feral Sheep	389						389
Moufflon Sheep	286		641				927
Black Tailed Deer						39	39
Axis Deer			655				655
Total	1640	329	1296	108	341	1381	5095
Mammal Hunter Effort	6718	1332	3058	175	3341	11595	26219
Mammals/Hunter Trip	0.24	0.25	0.42	0.62	0.10	0.12	0.19
Game Birds	4666	372	124	14	370	568	6114
Bird Hunter Effort	5150	529	241	13	1029	2032	8994
Birds/Hunter Trip	0.91	0.70	0.51	1.08	0.36	0.28	0.68

99-00

	Hawaii	Maui	Lanai	Molokai	Oahu	Kauai	Total
Feral Pig	750	369		69	221	428	1837
Feral Goat	99	54		77	68	697	995
Feral Sheep	324						324
Moufflon Sheep	186		484				670
Black Tailed Deer						0	0
Axis Deer			698				698
Total	1359	423	1182	146	289	1125	4524
Mammal Hunter Effort	4613	1857	3138	257	3172	7844	20881
Mammals/Hunter Trip	0.29	0.23	0.38	0.57	0.09	0.14	0.22
Game Birds	2948	246	18	55	151	Closed	3418
Bird Hunter Effort	2100	285	66	9	696	Closed	3156
Birds/Hunter Trip	1.40	0.86	0.27	6.11	0.22	N/A	1.08

00-01

	Hawaii	Maui	Lanai	Molokai	Oahu	Kauai	Total
Feral Pig	887	488		55	262	659	2351
Feral Goat	200	62		66	133	761	1222
Feral Sheep	546						546
Moufflon Sheep	236		455				691
Black Tailed Deer						81	81
Axis Deer			500				500
Total	1869	550	955	121	395	1501	5391
Mammal Hunter Effort	8043	2340	3015	315	3814	13139	30666
Mammals/Hunter Trip	0.23	0.24	0.32	0.38	0.10	0.11	0.18
Game Birds	4404	331	Closed	60	337	1257	6389
Bird Hunter Effort	4161	476	Closed	13	1078	2029	7757
Birds/Hunter Trip	1.06	0.70		4.62	0.31	0.62	0.82

FIGURE 10.

Resource allocations per acre

Landowner	Management Expenditures Per Acre
U.S. Army Ecosystem management of O`ahu training lands	$271
National Park Service Haleakala National Park, Maui	$122
Natural Area Partnership Program (NAPP)	$66
US Fish and Wildlife Service Hakalau National Wildlife Refuge, Hawai'i	$56
Department of Land Natural Resources (DLNR) Natural Area Reserve System	$11

**Source: NARS Report to the Legislature, November 2000*

FIGURE 11.

DOFAW Assistance to Hunters 1998-2001

Action	Number	Island
Manned hunter checking stations	19	Kaua`i
Established new photo stations	21	Kaua`i
Deer browse surveys	44	Kaua`i
Helicopter feral goat survey	2	O`ahu
Game bird surveys	4	O`ahu
Feral Pig Transect Surveys	10	O`ahu
Fitting feral sheep with Transmitters	6	Hawai'i
Install Photo stations	2	Hawai'i
Conducted Wild Turkey counts	NA	Hawai'i
Capture, band and track wild turkeys	NA	Hawai'i

FIGURE 12.

Trails and Access Roads under Na Ala Hele jurisdiction

Island	Number of Trails	Mileage	Number of Access Roads	Mileage
Kaua`i	20	108	12	72
O`ahu	39	65	4	20
Maui (*Includes Lāna'i and Moloka`i*)				
	22	71	5	78
Hawai'i	12	39	3	132
Total	**93**	**283**	**24**	**326**

The table above delineates approximate mileage under DOFAW and in the Nā Ala Hele program. These features are maintained at a minimum of at least once per year based upon v egetation cycles, topography and degree of public use. Routine maintenance involves cutting back encroaching v egetation. Pending the availability of the six-member staff and community volunteers, service projects are conducted to improve the trail surface conditions.

FIGURE 13.

Kaulunani Urban Forestry Stewardship Program, 1998-2001

Action Taken	Number Assisted
Community Assistance	72 separate homeowners
State Stewardship Assistance Program	21 landowners
Approved Forest Stewardship Management Plans	3,761 acres
Provided $207,992 to participants in the Kaulunani Program	72 participants
Operated the Central Tree Nursery in Kamuela Produced	228,953 seedlings